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VIRGINIA PEREGRINE FALCON MONITORING AND MANAGEMENT PROGRAM: YEAR 2017 REPORT



**THE CENTER FOR CONSERVATION BIOLOGY
COLLEGE OF WILLIAM AND MARY
VIRGINIA COMMONWEALTH UNIVERSITY**

VIRGINIA PEREGRINE FALCON MONITORING AND MANAGEMENT PROGRAM: YEAR 2017 REPORT

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Project Partners:

**The Virginia Department of Game and Inland Fisheries
National Aeronautics and Space Administration
National Park Service
United States Fish and Wildlife Service
United States Forest Service
Virginia Department of Transportation
The Nature Conservancy
Dominion Power
United States Coast Guard
The Center for Conservation Biology**

Front Cover: Adult female with eggs on James River Bridge. Photo by Bryan Watts.



The Center for Conservation Biology is an organization dedicated to discovering innovative solutions to environmental problems that are both scientifically sound and practical within today's social context. Our philosophy has been to use a general systems approach to locate critical information needs and to plot a deliberate course of action to reach what we believe are essential information endpoints.

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EXECUTIVE SUMMARY

The peregrine falcon (*Falco peregrinus*) was believed to be extirpated as a breeding species in Virginia by the early 1960s. An aggressive restoration program was initiated in 1978 that included the release of 115 captive-reared birds on the Coastal Plain (1978-1985) and 127 birds in the mountains (1985-1993). This program resulted in the first breeding of the modern era in 1982. Since this time, the population has proceeded through a rapid establishment phase followed by a consolidation phase. However, more than 95% of all breeding activity over the past 30 years has occurred on the Coastal Plain with very limited breeding within the historic mountain range. Since 2000 a dedicated translocation program has moved more than 250 birds from eyries on the coast to hack sites in the mountains in an effort to restore the mountain breeding population. Restoration of the breeding population in the mountains continues to be a management priority for the state.

In 2017, Virginia supported a known falcon population of 29 breeding pairs including 26 within the Coastal Plain, 1 in the Piedmont and 2 in the mountains. This represents the fifth consecutive year that the population has exceeded 25 breeding pairs but is 2 pairs less than the record year of 2016. New breeding territories were documented on a smokestack along the Rappahannock River and a bridge across the Chickahominy River. Long-time territories including the Norris Bridge, Watts Island and the Highrise Bridge (I-64) were vacant in 2017. Single birds were observed on the I-295 bridge across the James and on Stony Man within Shenandoah National Park.

2017 was a mixed breeding year with a relatively high hatching rate (81%, 56 of 69 eggs hatched) but some losses both before banding (16.1%, 9 of 56 young lost) and after fledging (3 young known to be lost post-fledging). Of 21 clutches that were followed completely from laying to fledging, 41 of 53 (77.4%) eggs hatched and 35 of 41 (85.4%) young survived to banding age. The reproductive rate (1.62 young/occupied territory) was considerably lower than in recent years.

Efforts continued in 2017 to identify breeding adults via field-readable bands to better understand dispersal and demography throughout the mid-Atlantic region. The banding status of 47 (81%) of the 58 adult peregrines known within the breeding population was determined. Ten (21%) of the 47 birds were unbanded. The alpha-numeric bands were read for 29 adults and of these the USGS bands have been recorded for 26. Of the banded birds where state of origin could be determined, 22 were from VA, 5 from NJ and 3 from MD. All three of the unknown birds had silver USGS and were likely from MD. The natal territories were determined for 25 adults. Birds ranged in age from 2 to 17 years old.

Bands for 12 additional falcons were read and reported over the past year. Seven of these birds (all females) originated in Virginia and were found breeding in other states (Table 5). This included 3 birds in Pennsylvania and 4 birds in New Jersey. A second-year female was photographed multiple times on Chincoteague National Wildlife Refuge. A hatch-year male from Richmond was photographed in Lyndhurst, NJ and a hatch-year female that had been hacked in Shenandoah National Park was photographed near Silver Lake in Rockingham County, VA. A 5-year old female was identified in Westchester, NY during the early breeding season and may have been on territory.

BACKGROUND

Context

The historical population of peregrine falcons (*Falco peregrinus*) in the eastern United States was estimated to contain approximately 350 breeding pairs, relied on open cliff faces and cut-banks for nesting, and was mostly confined to the Appalachian Mountains (Hickey 1942). The population experienced a precipitous decline throughout the 1950s (Hickey 1969) due to contaminant-induced reproductive suppression (Anderson and Hickey 1972) and was believed to have been extirpated by the early 1960s (Berger et al. 1969). The peregrine falcon was listed as endangered on the U.S. Federal List of Endangered and Threatened Wildlife (50 CFR 17.11-17.12) in June 1970. In 1975, the U.S. Fish and Wildlife Service appointed an Eastern Peregrine Falcon Recovery Team to develop and implement a recovery plan (Bollengier et al. 1979). A retrospective assessment of the historic peregrine falcon population in Virginia identified 24 historical eyries in the Appalachian Mountains (Gabler 1983). Two additional nesting sites were documented on old osprey nests along the Virginia portion of the Delmarva Peninsula (Jones 1946).

As part of a national effort to restore the eastern peregrine population, the Virginia Department of Game and Inland Fisheries, Cornell University, and the College of William and Mary initiated a hacking program for Virginia in 1978. The program involved the release of captive-reared peregrines with the hope that these birds would re-colonize the historic breeding range. Between 1978 and 1993, approximately 250 young falcons were released in Virginia. Since the close of this program, captive-reared peregrines have been released on a limited basis within the state. Such releases have involved more targeted projects. Beginning in 2000, Virginia initiated a translocation program that has moved birds from coastal territories to be hacked from mountain release sites. The program has taken advantage of young produced from sites where fledging success has been poor. More than 250 birds have been moved since the inception of the program.

The first successful nesting of peregrines falcons in Virginia after the DDT era occurred in 1982 on Assateague Island. Since that time, the breeding population has continued a slow but steady increase. The size of the known breeding population within Virginia now exceeds 25 pairs. However, both hatching rate and chick survival remain somewhat erratic in both the coastal and mountain breeding populations. An analysis by the U.S. Fish and Wildlife Service in the early 1990s of addled eggs collected in Virginia, showed levels of DDE, Dieldrin, and egg-shell thinning that have been shown previously to have an adverse impact on reproduction. An additional problem that has been suspected but not fully quantified is that the turnover rate of breeding adults appears to be high. At present, the long-term viability of the Virginia population in the absence of continued immigration from surrounding populations remains questionable. Continued monitoring and management of this population is needed to ensure that the population will continue to recover.

OBJECTIVES

The objectives of this project were:

- 1) to track the recovery of the breeding population of peregrine falcons in Virginia (both in terms of the size and distribution of the breeding population and the number of young produced),
- 2) to evaluate the success of past and present management techniques used with the breeding population,
- 3) to improve productivity of nesting pairs through active management, and
- 4) to increase our understanding of peregrine falcon natural history in the mid-Atlantic region.

METHODS

Geographic Focus

As in previous years, monitoring in 2017 was focused on the Coastal Plain where most breeding activity has been known. Additional efforts focused on mountain sites (Harding 2017) and those efforts are summarized in this report to provide a state-wide overview.

Nest Site Surveys

Between 1977 and 2009, more than 60 structures were established specifically for breeding peregrine falcons within the Coastal Plain of Virginia (Table 1). An effort was made to check all of the existing structures on the Coastal Plain that survived to the 2017 breeding season for evidence of resident falcons. An initial survey of breeding structures on the Coastal Plain was conducted between 1 March and 30 April by foot or boat. The number of adults attending sites and/or activity within the nest box was recorded. Remaining sites on bridges or within urban areas were surveyed on the ground for occupation and activity. Sites were surveyed in the mountains by the Virginia Department of Game & Inland Fisheries (DGIF), and the National Park Service (NPS).

Coastal sites that were confirmed to have peregrine activity were monitored with 2-5 additional ground visits to document breeding activity, to band young and to document fledging success. A breeding territory was considered to be “occupied” if a pair of adult peregrines was resident during the breeding season. Nests were considered to be “active” if eggs or young were detected (Postupalsky 1974). Complete breeding information (e.g. clutch size, hatching rate) could not be obtained for a small portion of active sites due to poor access. However, the number of birds surviving to banding age was determined for all active sites when possible. Reproductive rates were calculated using number of chicks reaching banding age.

Banding

An attempt was made to band all chicks surviving to banding age (18-35 d). Chicks were banded with a USGS lock-on, aluminum tarsal band on the right leg and a bi-colored, green and black, alpha-numeric auxiliary band on the left leg. USGS bands used in Virginia during the 2017 breeding season were anodized green. Band size 6 and 7a were used for male and female chicks respectively. Auxiliary bands were applied with two pop rivets. Hacked falcons were also identified with colored electrical tape applied to the USGS band for temporary identification at the hack site. Accessing nests required coordination and assistance from state, federal, NGO, and corporate partners.

Band Resights

Effort was made to identify individual breeding adults at each nest by reading band codes. Bands were identified through a Bushnell Natureview Cam HD max game camera mounted on the nest box platform, live webcams broadcast online, and by digital photos taken during visits to the nest.

Translocations

Since the early 1990s, many young have been lost at fledging age on coastal bridges. Numerous chicks have been lost in the water during early flights when they are unable to fly back up to nest structures. Other chicks have flown down to the roadbed and been killed by automobiles.

In order to improve survivorship for high-risk sites, a program was initiated to translocate chicks to mountain release sites. Chicks are typically removed from nest sites, transported to mountain sites, and released using standard hacking techniques (Sherrod et al. 1981). In keeping with the objectives of facilitating the re-colonization of the historic mountain range chicks were hacked from a high priority mountain site in Shenandoah National Park (SNP). Only chicks from bridge nests were removed for the hacking program because of limited space in the hack box. Chicks that were found on the ground during fledging or taken to rehabilitation facilities were also included for release from hack sites. SNP has two hack boxes and the hacking program takes up to 10 birds aged for synchronous release. SNP staff led by Rolf Gubler open the door to the hack box at 45-50 days old. Food is provided at the hack site for 6 weeks. Survival is confirmed when the falcons return to the hack site to feed each day (Sherrod et al 1981).

Addled Eggs

Unhatched eggs were collected from nests if eggs were no longer being incubated. Eggs were washed, air dried, covered with aluminum foil and frozen.

RESULTS

Nest Site Surveys

Fifty-one structures were surveyed for peregrine falcon activity within the Coastal Plain (Table 1) and several additional sites were surveyed by VDGIF in the mountains during the breeding season. Twenty-nine sites supported occupied territories. Breeding sites were found across the state (Figure 1). Occupied territories were distributed within the Coastal Plain (n = 26), Piedmont (n = 1) and mountains (n = 2; White Rocks territory assumed to be occupied).

Structures supporting occupied territories included 11 peregrine towers, 8 bridges, 2 cliffs, 3 buildings, 2 marsh shacks, and 3 power plant stacks (Table 2). The Watts Island tower was washed away during the summer of 2016 and no pair was observed on the island in 2017. No pair was detected in association with the Norris Bridge. A new pair nested for the first time on the Dresser Bridge across the Chickahominy River and a pair was documented early in the season around the box on the Birchwood Power Plant. Single adults were recorded on multiple occasions on the I-295 bridge across the James River and in the vicinity of Stony Man in Shenandoah National Park.

Table 1. Catalog of nesting structures established for Peregrine Falcons in Virginia (1977-2017). Table gives the type of structure, year of establishment where appropriate and whether or not the site was checked for Peregrine Falcon activity during the 2017 breeding season.

Site Code	Location Description	Structure Type	Year Est	2017
VA-PEFA-02	Cobb Island Tower	Peregrine Tower	1978	Y
VA-PEFA-06	Wallops Island Tower	Peregrine Tower	1981	Y ^a
VA-PEFA-10	Finney's Island Tower	Peregrine Tower	1997	Y
VA-PEFA-12	Hyslop Marsh Tower	Peregrine Tower	1995	Y
VA-PEFA-13	Saxis Marsh N. Tower	Peregrine Tower	1996	Y
VA-PEFA-14	Saxis Marsh S. Tower	Peregrine Tower	1998	Y
VA-PEFA-15	Parker Marsh Tower	Peregrine Tower	1997	Y
VA-PEFA-16	Elkins Marsh Chimney	Nest Box	1995	Y
VA-PEFA-17	Elkins Marsh Shack Tower	Nest Box/Tower	1997/2004	Y
VA-PEFA-18	Wachapreague Shack Tower	Peregrine Tower	1994/2000	Y
VA-PEFA-20	Coleman Bridge Box Rt 17	Nest Box	1989	Y

Site Code	Location Description	Structure Type	Year Est	2017
VA-PEFA-21	Norfolk Southern RxR Bridge	Bridge	1992	Y
VA-PEFA-22	James River Bridge Rt 17	Nest Box	1991	Y
VA-PEFA-23	Berkley Bridge I-264	Nest Box	1996	Y
VA-PEFA-24	Benjamin Harrison Bridge Rt 106	Nest Box	1996	Y
VA-PEFA-25	Mills Godwin Bridge Rt 17	Nest Box	1996	Y
VA-PEFA-26	West Norfolk Bridge Rt 164	Nest Box	1996	Y
VA-PEFA-27	Norris Bridge Rt 3	Nest Box	1989	Y
VA-PEFA-28	Little Stony Man, SNP	Natural Cliff Face	-----	Y ^b
VA-PEFA-29	Old Rag, SNP	Natural Cliff Face	-----	Y ^b
VA-PEFA-34	Mockhorn Island Tower	Peregrine Tower	1997	Y
VA-PEFA-36	Upsher Bay Tower	Peregrine Tower	2000	Y
VA-PEFA-37	Silver Beach Range Tower	Nest Box	1997	Y
VA-PEFA-38	Hawksbill Mountain, SNP	Natural Cliff Face	-----	Y ^b
VA-PEFA-39	Concrete Ships	Nest Box	1995	Y
VA-PEFA-40	Chesterfield Substation	Nest Box	1998	Y
VA-PEFA-41	Holiday Inn VA Beach	Nest Box	1997	Y
VA-PEFA-42	Possum Point Substation	Nest Box	1998	Y
VA-PEFA-43	Newport News City Hall	Nest Box	1993	Y
VA-PEFA-45	Cargill Grain Elevator	Nest Box	1993	Y
VA-PEFA-46	Lafayette Bridge Rt 337	Nest Box	1998	Y
VA-PEFA-48	Churchland Bridge US 17	Nest Box	1999	Y
VA-PEFA-49	Yorktown Substation	Nest Box	1998	Y
VA-PEFA-51	Campostella Bridge Rt 168	Nest Box	1998	Y
VA-PEFA-52	Highrise Bridge I-64	Nest Box	1999	Y

Site Code	Location Description	Structure Type	Year Est	2017
VA-PEFA-53	ALCOA RxR Bridge	Nest Box	1999	Y
VA-PEFA-54	I-295 Bridge	Nest Box	2001	Y
VA-PEFA-55	Dominion Building	Nest Box	2000	Y ^c
VA-PEFA-56	River Front Plaza Building	Nest Box	2002	Y ^c
VA-PEFA-57	BB&T Building	Nest Box	1984	Y ^c
VA-PEFA-59	Bermuda Hundred	Nest Box	1998	Y
VA-PEFA-60	Chesapeake Bay Bridge Tunnel	Pier Cap	2004	Y
VA-PEFA-61	Tappahannock Bridge Rt 360	Nest Box	2004	Y
VA-PEFA-62	Gull Marsh Tower	Peregrine Tower	2004	Y
VA-PEFA-63	Godwin Island Box	Nest Box	2004	Y
VA-PEFA-65	Craddock Neck	Peregrine Tower	1995	Y
VA-PEFA-66	Hoffler Building Virginia Beach	Nest Box	2009	Y
VA-PEFA-67	White Rocks	Natural Cliff Face	-----	Y ^c
VA-PEFA-68	Big House Mountain	Natural Cliff Face	-----	Y ^c
VA-PEFA-69	Breaks Interstate Park	Natural Cliff Face	-----	Y ^c
VA-PEFA-70	Pamunkey Eltham Bridge Rt 33	Nest Box	2017	Y
VA-PEFA-71	Cedar Island	Ground Nest	-----	Y ^c
VA-PEFA-72	Stony Man, SNP	Natural Cliff Face	-----	Y ^b
VA-PEFA-74	Birchwood Power Plant	Nest Box	2014	Y
VA-PEFA-75	Reston Town Center	Air Intake Vent	2015	Y
VA-PEFA-76	New Jordan Bridge	Pier Cap	2016	Y
VA-PEFA-77	Hazelwood Bridge	Pier Cap	2016	Y
VA-PEFA-78	Dresser Bridge Rt 5	Pier Cap	2017	Y

^a Nest monitored by NASA.

^b Nest monitored by NPS.

^c Nest monitored by VDGIF.

Figure 1. Distribution of Peregrine Falcon occupied territories and single individuals for the 2017 breeding season in Virginia.



Breeding Results

Virginia supported 29 known breeding pairs of peregrine falcons during the 2017 breeding season. This is the second largest breeding population ever recorded in the state and fifth consecutive year that the state has supported more than 25 known breeding pairs (Figure 2). The 25 falcon pairs that were documented making breeding attempts produced at least 69 eggs (Table 2). At least 56 of the 69 eggs hatched. Nine (16.1%) of the 56 hatchlings did not survive to banding age. One of the young in Richmond was not progressing, was taken to the Wildlife Center and died while under care. All 3 of the young on Wallops tower disappeared the day before scheduled banding (26 to 28 days old) and were presumably taken by a great horned owl. All 3 of the young hatched on the Armada Hoffer building apparently died during a rain storm. Two of the 3 young on the Eltham Bridge were found on the concrete piling under the nest box (22 days old including 1 male and 1 female) and appeared to have fallen out of the box. Three young were documented to be lost shortly after fledging including a female that was hit on the roadway on the Benjamin Harrison Bridge, a female that was found washed up along the shoreline near the Silver Beach Range Tower and a female that flew into the side of a building in Richmond. The reproductive rate was 1.62 young/occupied territory and 1.88 young/active territory. Of 21 clutches that were followed completely

from laying to fledging, 41 of 53 (77.4%) eggs hatched, and 35 of 41 (85.4%) young survived to banding age.

Figure 2. Virginia Peregrine Falcon breeding population (1980-2017).

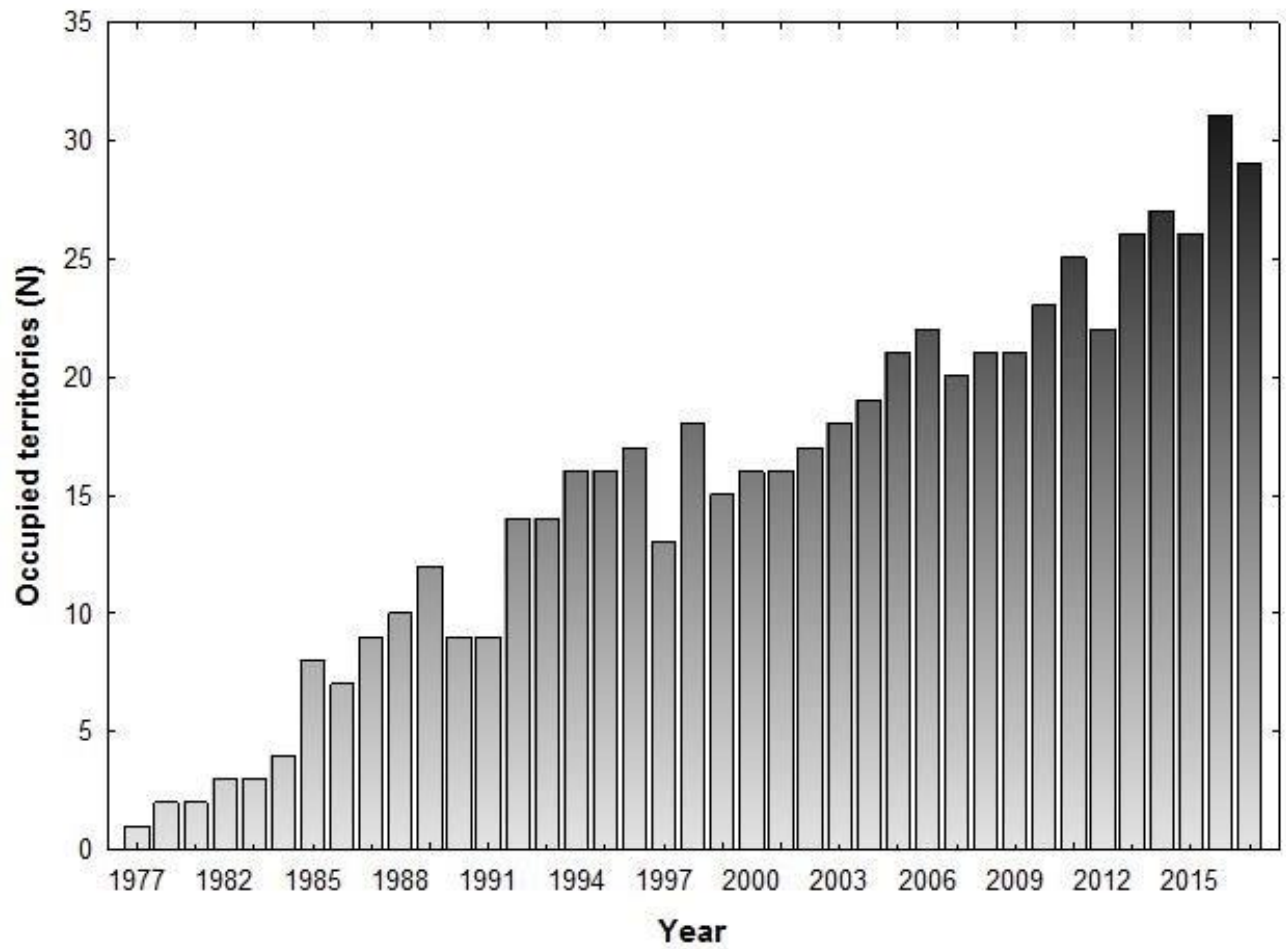


Table 2. Summary of breeding activity for peregrine falcon pairs in Virginia during the 2017 breeding season.

Site Code	Nest name	Occ Terr	Active Nest	Eggs	Young Hatched	Band Age
VA-PEFA-02	Cobb Island Tower	Y	N	-----	-----	-----
VA-PEFA-06	Wallops Island Tower	Y	Y	3	3	0
VA-PEFA-10	Finney's Island Tower	Y	Y	4	4	4
VA-PEFA-12	Hyslop Marsh Tower	Y	Y	≥1	U	0
VA-PEFA-15	Parker's Marsh Tower	Y	Y	3	3	3
VA-PEFA-16	Elkins Marsh Chimney	Y	Y	≥1	≥1	1
VA-PEFA-17	Elkins Marsh Shack Tower	Y	Y	4	4	4
VA-PEFA-18	Wachapreague Shack Tower	Y	Y	≥2	≥2	2
VA-PEFA-22	James River Bridge Rt 17	Y	Y	3	3	3 ^a
VA-PEFA-23	Berkley Bridge I-264	Y	Y	≥1	0	0
VA-PEFA-24	Benjamin Harrison Bridge	Y	Y	≥3	≥3	3 ^b
VA-PEFA-25	Mills Godwin Bridge Rt 17	Y	Y	3	1	1 ^a
VA-PEFA-34	Mockhorn Island Tower	Y	Y	≥1	0	0
VA-PEFA-36	Upsher Bay Tower	Y	Y	3	1	1
VA-PEFA-37	Silver Beach Range Tower	Y	Y	3	3	3 ^c
VA-PEFA-42	Possum Point Substation	Y	Y	4	3	3 ^d
VA-PEFA-49	Yorktown Substation	Y	Y	4	2	2
VA-PEFA-56	River Front Plaza Building	Y	Y	3	3	2
VA-PEFA-60	Chesapeake Bay Bridge Tunnel	Y	Y	≥2	≥2	2
VA-PEFA-61	Tappahannock Bridge Rt 360	Y	Y	4	4	4 ^a
VA-PEFA-62	Gull Marsh Tower	Y	Y	≥1	≥1	1
VA-PEFA-63	Godwin Island Box	Y	Y	4	4	4

VA-PEFA-66	Armada Hoffer Building	Y	Y	4	3	0
VA-PEFA-67	White Rocks	Y ^e	U	-----	-----	-----
VA-PEFA-69	Breaks Interstate Park	Y	U	-----	-----	-----
VA-PEFA-70	Pamunkey Eltham Bridge Rt 33	Y	Y	4	3	1
VA-PEFA-74	Birchwood Power Plant	Y	N	-----	-----	-----
VA-PEFA-75	Reston Town Center	Y	Y	≥3	≥3	3
VA-PEFA-78	Dresser Bridge Rt 5	Y	Y	≥1	0	0

^a Young translocated to Shenandoah National Park and hacked.

^b Female young hit on roadbed of bridge and killed.

^c Female found dead after fledging along the shoreline.

^d Male and female found on ground, taken for rehab and hacked at Shenandoah National Park.

^e Territory assumed to be occupied, poor survey coverage, single bird resident late in season.

Selected Site and Breeding Observations

- The Cobb Island tower was occupied by great horned owls early in 2017. The pair waited but never produced any eggs. The female was identified and was 8 years old with arrested molt. The bird maintained very worn juvenile feathers.
- The Watts Island tower was lost in 2016 and no birds were observed on the island in 2017.
- The Norris Bridge had a significant, ongoing maintenance project and the nest site was covered in netting to prevent nesting. A nest box was placed away from the activity but no birds were observed during multiple visits.
- The I-64 Highrise bridge had a significant painting and maintenance project near the nest site and a blue tarp was placed over the box occluding use by peregrines. No birds were observed during multiple visits.
- The pair on the Benjamin Harrison Bridge nested on the south tower on a steel beam. The exact nest location was not located until late in the season and the young were too old to risk capture. The brood was 1 male and 2 females and one of the females was later collected after being hit by traffic on the road bed.
- A new nest box was installed on the Eltham Bridge to move the birds onto an unmovable structure on the bridge. The new box is away from maintenance areas and is accessible for management. The pair laid 4 eggs in the box and successfully raised 1 young.
- The eyrie within the Reston Town Center was located within an air intake vent on the Leidos Building. The building management company (Boston Properties) would not grant access to the site. Three falcons fledged from the site.

- Two of the 3 young falcons on the Possum Point stack were recovered on the ground and were later hacked within Shenandoah National Park.
- The Berkley pair was documented to incubate eggs from 11 April through 16 July when monitoring was ended.
- A new pair was discovered on the Dresser Bridge across the Chickahominy and both adults were unbanded. Eggs were incubated on the top of a piling under the bridge with both birds attending. The nesting attempt failed around hatching but the cause of failure could not be determined.
- A new pair was present early in the season around the box on the smoke stack of the Birchwood Power Plant and was filmed in courtship display. The birds did not produce eggs.

Banding

All young falcons that survived to banding age and that could be accessed were fitted with both USGS and alpha-numeric bands. This included 18 males and 20 females (Tables 3a and 3b). Birds known to be unbanded were 3 young (including 1 male and 2 females) on the Benjamin Harrison Bridge and 3 young (including 2 males and 1 female) on the Leidos Building in Reston.

Table 3a. List of band codes for female peregrine falcon chicks banded in Virginia during the 2017 breeding season.

USGS Band	Alpha-numeric Band	Nest	Date
1907-01926	87/AV	River Front Plaza Building	6/13/2017
1907-01973	11/BH	Yorktown Substation	5/16/2017
1907-01974	12/BH	Downing Bridge	5/17/2017
1907-01975	13/BH	Downing Bridge	5/17/2017
1907-01976	14/BH	Downing Bridge	5/17/2017
1907-01977	15/BH	Mills Godwin Bridge Rt 17	5/17/2017
1907-01979	17/BH	Possum Point Substation	5/19/2017
1907-01980	18/BH	Possum Point Substation	5/19/2017
1907-01982	20/BH	Silver Beach Range Tower	5/24/2017
1907-01983	21/BH	Godwin Island Box	5/27/2017

USGS Band	Alpha-numeric Band	Nest	Date
1907-01984	22/BH	Godwin Island Box	5/27/2017
1907-01985	23/BH	Elkins Marsh Shack Tower	5/27/2017
1907-01986	24/BH	Wachapreague Shack	5/31/2017
1907-01987	25/BH	Wachapreague Shack	5/31/2017
1907-01988	26/BH	Parkers Marsh Tower	5/31/2017
1907-01989	27/BH	Parkers Marsh Tower	5/31/2017
1907-01990	28/BH	Eltham Bridge Box	6/2/2017
1907-01991	29/BH	Finney's Island Tower	6/9/2017
1907-01992	30/BH	Finney's Island Tower	6/9/2017
1907-01993	31/BH	Upsher Neck Tower	7/13/2017

Table 3b. List of band codes for male peregrine falcon chicks banded in Virginia during the 2017 breeding season.

USGS Band	Alpha-numeric Band	Nest	Date
1126-11971	46/AU	River Front Plaza Building	6/13/2017
1126-11994	20/BM	Yorktown Substation	5/16/2017
1126-11995	21/BM	Possum Point Substation	5/22/2017
1126-11996	22/BM	Godwin Island Box	5/27/2017
1126-11997	27/BM	Godwin Island Box	5/27/2017
1126-11998	24/BM	Elkins Marsh Shack Tower	5/27/2017
1126-11999	25/BM	Elkins Marsh Shack Tower	5/27/2017
1126-12000	26/BM	Elkins Marsh Shack Tower	5/27/2017
2206-54801	27/BM	Silver Beach Range Tower	5/31/2017
2206-54802	28/BM	Silver Beach Range Tower	5/31/2017
2206-54803	29/BM	Parkers Marsh Tower	5/31/2017
2206-54804	30/BM	Gull Marsh Tower	6/9/2017
2206-54805	31/BM	James River Bridge	5/17/2017
2206-54806	32/BM	James River Bridge	5/17/2017
2206-54807	33/BM	James River Bridge	5/17/2017
2206-54808	34/BM	Downing Bridge	5/17/2017
2206-54809	35/BM	Finney's Island Tower	6/9/2017
2206-54810	36/BM	Finney's Island Tower	6/9/2017

Band Resights

The banding status of 47 (81%) of the 58 adult peregrines known within the breeding population was determined during the 2017 season (Table 4). Ten (21%) of the 47 birds were unbanded. The unbanded birds were skewed to females (3 males vs 7 females). The level of unbanded birds suggests the possibility of unknown eyries within Virginia or surrounding states. Of the banded birds where state of origin could be determined, 22 were from VA, 5 from NJ and 3 from MD. The alpha-numeric bands were read for 29 adults and of these the USGS bands have been recorded for 26. All three of the unknown birds had silver USGS and were likely from MD. The natal territories were determined for 25 adults. Birds ranged in age from 2 to 17 years old.

Bands for 12 additional falcons were read and reported over the past year. Seven of these birds (all females) originated in Virginia and were found breeding in other states (Table 5). This included 3 birds in Pennsylvania and 4 birds in New Jersey. The old (19 years) female from Wachapreague that has nested in Atlantic City for years was resident but produced no eggs for the fifth consecutive year but did raise a young fostered to it by the state. A second-year female was photographed multiple times on Chincoteague National Wildlife Refuge. A hatch-year male from Richmond was photographed in Lyndhurst, NJ and a hatch-year female that had been hatched in Shenandoah National Park was photographed near Silver Lake in Rockingham County, VA. A 5-year old female was identified in Westchester, NY during the early breeding season and may have been on territory.

Table 4. Banding status and identification of Virginia breeding peregrine falcons during the 2017 season.

Territory Code	Territory	Sex	USGS Band Color	USGS Band	ACRAFT Color	ACRAFT Code	Origin	Age
VA-PEFA-02	Cobb Island Tower	M	-----	Unbanded	-----	-----	Unknown	
VA-PEFA-02	Cobb Island Tower	F	Green	1807-65005	B/G	00/AD	Mockhorn Island, VA	8
VA-PEFA-06	Wallops Island Tower	M	Unknown	Unknown	Unknown	Unknown	Unknown	
VA-PEFA-06	Wallops Island Tower	F	-----	Unbanded	-----	-----	Unknown	
VA-PEFA-10	Finney's Island Tower	M	Green	1126-11939	B/G	15/AU	Watts Island, VA	3
	Finney's Island Tower	F	Black	1687-02832	B/G	A/15	Dividing Creek, NJ	8
8VA-PEFA-12	Hyslop Marsh Tower	M	Green	1126-11860	B/G	26/AS	Finney's Marsh, VA	6
	Hyslop Marsh Tower	F	Unknown	Unknown	Unknown	Unknown	Unknown	
VA-PEFA-15	Parker Marsh Tower	M	Green	1126-11955	B/G	31/AU	Upsher Bay Tower, VA	2
	Parker Marsh Tower	F	Green	Unknown	B/G	7?/A?	Unknown, VA	
VA-PEFA-16	Elkins Marsh Chimney	M	Green	Unknown	B/G	Unknown	Unknown, VA	
	Elkins Marsh Chimney	F	Black	1807-37497	B/R	B/*S	Heislerville Tower, NJ	15
VA-PEFA-17	Elkins Marsh Shack Tower	M	Green	2206-81637	B/G	09/W	Upsher Bay Tower, VA	9
	Elkins Marsh Shack Tower	F	Silver	1907-03507	B/G	65/AD	Smith Island Tower 2, MD	7
VA-PEFA-18	Wachapreague Shack Tower	M	Green	Unknown	B/G	Unknown	VA	

Territory Code	Territory	Sex	USGS Band Color	USGS Band	ACRAFT Color	ACRAFT Code	Origin	Age
	Wachapreague Shack Tower	F	Green	1807-02732	B/G	25/V	Gull Marsh Tower,VA	11
VA-PEFA-22	James River Bridge Rt 17	M	Green	2206-43454	B/G	*7/*C	James River Bridge, VA	16
	James River Bridge Rt 17	F	-----	Unbanded	-----	-----	Unknown	
VA-PEFA-23	Berkley Bridge I-264	M	Green	Unknown	B/G	Unknown	Unknown, VA	
	Berkley Bridge I-264	F	-----	Unbanded	-----	-----	Unknown	
VA-PEFA-24	Benjamin Harrison Bridge Rt 106	M	Green	2206-81605	B/G	05/Y	BB&T Richmond, VA	12
	Benjamin Harrison Bridge Rt 106	F	Green	1807-02775	B/G	70/Z	Benjamin Harrison, VA	9
VA-PEFA-25	Mills Godwin Bridge Rt 17	M	-----	Unbanded	-----	-----	Unknown	
	Mills Godwin Bridge Rt 17	F	Green	1807-65098	B/G	57/AV	Mockhorn Island, VA	4
VA-PEFA-34	Mockhorn Island Tower	M	Unknown	Unknown	Unknown	Unknown	Unknown	
	Mockhorn Island Tower	F	Unknown	Unknown	Unknown	Unknown	Unknown	
VA-PEFA-36	Upsher Bay Tower	M	Green	1126-11861	B/G	39/AS	Watts Island Tower, VA	6
	Upsher Bay Tower	F	Green	1907-01921	B/G	84/AV	Cobb Island Tower, VA	3
VA-PEFA-37	Silver Beach Range Tower	M	Unknown	Unknown	Unknown	Unknown	Unknown	

Territory Code	Territory	Sex	USGS Band Color	USGS Band	ACRAFT Color	ACRAFT Code	Origin	Age
	Silver Beach Range Tower	F	Black	987-95669	B/G	56/Y	Sea Isle City,NJ	11
VA-PEFA-42	Possum Point Substation	M	Silver	816-69379	B/G	X/78	Chalk Point Plant, MD	9
	Possum Point Substation	F	Black	987-95657	B/G	*Y/*4	Betsy Ross Bridge, NJ	11
VA-PEFA-49	Yorktown Substation	M	-----	Unbanded	-----	-----	Unknown	
	Yorktown Substation	F	Black	1687-02889	B/G	32/AN	Tuckahoe River, NJ	5
VA-PEFA-56	River Front Plaza Building	M	Silver	2206-07444	B/R	*V/S	VA, Unknown	17
	River Front Plaza Building	F1	-----	Unbanded	-----	-----	Unknown	
	River Front Plaza Building	F2	Green	1907-01914	B/G	70/AV	Silver Beach, VA	3
VA-PEFA-60	Chesapeake Bay Bridge Tunnel	M	Silver		B/G	16/AK	Clay Island WMA, MD	5
	Chesapeake Bay Bridge Tunnel	F	-----	Unbanded	-----	-----	Unknown	
VA-PEFA-61	Tappahannock Bridge Rt 360	M	Silver	1126-15169	B/G	30/AH	Unknown	
	Tappahannock Bridge Rt 360	F	Silver	Unknown	B/G	26/AK	Unknown	
VA-PEFA-62	Gull Marsh Tower	M	Green	Unknown	B/G	Unknown	Unknown	
	Gull Marsh Tower	F	Silver	Unknown	None	-----	Unknown	
VA-PEFA-63	Godwin Island Box	M	Green	1126-11848	B/G	14/AS	Mockhorn Island, VA	7
	Godwin Island Box	F	Green	1807-02726	B/G	20/V	Upsher Bay Tower, VA	11

Territory Code	Territory	Sex	USGS Band Color	USGS Band	ACRAFT Color	ACRAFT Code	Origin	Age
VA-PEFA-66	Hoffler Building Virginia Beach	M	Green	1126-11943	B/G	19/AU	Elkins Shack Tower, VA	3
	Hoffler Building Virginia Beach	F	-----	Unbanded	-----	-----	Unknown	
VA-PEFA-67	White Rocks	M	Unknown	Unknown	Unknown	Unknown	Unknown	
	White Rocks	F	Unknown	Unknown	Unknown	Unknown	Unknown	
VA-PEFA-69	Breaks Interstate Park	M	Unknown	Unknown	Unknown	Unknown	Unknown	
	Breaks Interstate Park	F	Unknown	Unknown	Unknown	Unknown	Unknown	
VA-PEFA-70	Pamunkey Eltham Bridge Rt 33	M	-----	Unbanded	-----	-----	Unknown	
	Pamunkey Eltham Bridge Rt 33	F	Green	1807-65016	B/G	11/AD	Elkins Shack Tower, VA	6
VA-PEFA-74	Birchwood Power Plant	M	Unknown	Unknown	Unknown	Unknown	Unknown	
VA-PEFA-74	Birchwood Power Plant	F	Unknown	Unknown	Unknown	Unknown	Unknown	
VA-PEFA-75	Reston Town Center	M	Silver	Unknown	B/G	29/AH	Unknown	
	Reston Town Center	F	Red Tape	Unknown	B/G	Unknown	Unknown	

Table 5. Identification of Virginia-hatched birds known to breed in other states during 2017.

Breeding Territory	Sex	USGS Band	ACRAFT Color	ACRAFT Code	Origin	Age
Pittsburgh, PA Cathedral	F	1807-02774	B/G	69/Z	Benjamin Harrison Br, VA	9
Columbia, PA Rt 462 Bridge	F	1807-65014	B/G	09/AD	James River Br, VA	7
Safe Harbor RR Bridge, PA	F	1807-65083	B/G	45/AV	Mills Godwin Br, VA	4
Atlantic City Hilton, NJ	F	0987-76814	B/R	*P/*G	Wachapreague Tower, VA	19
Dividing Creek WMA, NJ	F	1807-02735	B/G	29/V	Wachapreague Tower, VA	11
Heislerville water tower, NJ	F	1807-65062	B/G	23/AV	Elkins Marsh Shack, VA	5 ^a
Burlington-Bristol Bridge, NJ	F	1807-65079	B/G	41/AV	Berkley Bridge, VA	4

^a Bird was present early in the season but was replaced.

Table 6. Resights of Virginia peregrine falcons made since the 2016 report.

Resight Location	Resight Date	Sex	USGS Band	ACRAFT Color	ACRAFT Code	Origin	Age
Nr Chincoteague NWR, VA	12/21/2017	F	1907-01947	B/G	73/AU	Watts Island, VA	2
Silver Lake, VA	10/22/2017	F	1907-01977	B/G	15/BH	Mills Godwin Bridge, VA	HY
Nr Chincoteague NWR, VA	9/28/2017	F	1907-01947	B/G	73/AU	Watts Island, VA	2
Lyndhurst, NJ	8/13/2017	M	1126-11971	B/G	46/AU	Richmond, VA	HY
Westchester County, NY	3/24/2017	F	1807-65072	B/G	33/AV	Finneys Island Tower, VA	5

Translocations

During the 2017 season, 10 young falcons (including 5 females and 5 males) were translocated to Shenandoah National Park and hatched (Table 7). All birds were from bridges that have experienced poor fledging success except 2 birds that were found on the ground under the Possum Point stack around the time of fledging. All birds fledged and dispersed successfully.

Table 7. Summary of translocation activities for peregrine falcons in Virginia during the 2017 breeding season. Electrical tape was applied to the USFWS band.

USGS Band	Nest Site	Sex	Tape Color	Date Collected	Translocation Site
1907-01974	Downing Bridge	F	Red	5/17/2017	Shenandoah National Park
1907-01975	Downing Bridge	F	Blue	5/17/2017	Shenandoah National Park
1907-01976	Downing Bridge	F	Yellow	5/17/2017	Shenandoah National Park
1907-01977	Mills Godwin Bridge Rt 17	F	Orange	5/17/2017	Shenandoah National Park
1907-01980	Possum Point Substation	F	Gray	5/19/2017	Shenandoah National Park
1126-11995	Possum Point Substation	M	Red/White	5/22/2017	Shenandoah National Park
2206-54805	James River Bridge	M	Yellow/Green	5/17/2017	Shenandoah National Park
2206-54806	James River Bridge	M	White/Blue	5/17/2017	Shenandoah National Park
2206-54807	James River Bridge	M	Red/Green	5/17/2017	Shenandoah National Park
2206-54808	Downing Bridge	M	None	5/17/2017	Shenandoah National Park

Addled Eggs

Five addled falcon eggs were recovered during the 2017 breeding season (Table 8). Eggs were recovered from 4 sites including 1 bridge, 2 smoke stacks and 1 tower.

Table 8. Addled eggs collected during the 2017 breeding season.

Site	Date	Eggs
Possum Point Substation	4/28/17	1
Yorktown Substation	5/1/17	2
Mills Godwin Bridge	5/17/17	1
Silver Beach Tower	5/24/17	1

DISCUSSION

Between 1975 and 1993 more than 430 captive-reared falcons were released into the mid-Atlantic region as part of an effort to restore the eastern peregrine falcon population. The regional breeding population proceeded through an establishment phase (1979-1985) driven by releases with an average doubling time of 1.3 years to a consolidation phase (1986-) with an average doubling time of 23.4 years (Watts et al. 2015). Reproductive rates have increased significantly over this period from 1.18 young/occupied territory during establishment to 1.87 young/occupied territory as the population has become more stable.

Since the first breeding attempt was documented on Assateague Island in 1982, the Virginia population has exhibited steady growth. To date, growth has been driven by established pairs on the Coastal Plain. Pairs along the coast have accounted for more than 95% of all breeding attempts in the modern era and young produced are responsible for the ongoing formation of new territories. Currently, coastal pairs nesting on artificial substrates represent the demographic engine that is maintaining the state population.

Recent efforts to identify marked adults in both Virginia and New Jersey are providing significant information on dispersal, adult turnover rates, and the age structure of the breeding population. Capitalizing on efforts to mark all young in the region should be a priority for the foreseeable future. Expanding the effort to other neighboring states (e.g. MD, DE, NC, WV) would expand our understanding of movement patterns.

With few exceptions, establishment of breeding territories within the historic mountain range have been the result of the earlier hacking program (1985-1993) and the more recent translocation project (2000-2017) focused on the mountains. Since 2000, the latter has made use of young produced on bridge and building eyries that have experienced poor fledging success. This is a win-win situation and should continue as long as partners are willing and able to operate the hacks. If possible, new hack sites should be developed and operated in southwestern Virginia around historic breeding sites.

Recent efforts to survey a larger portion of the mountain range are exciting. Although effort-intensive, there is no way of assessing success of the ongoing management program except to continue survey work. Once breeding pairs have been located, increasing the frequency of monitoring may help to improve information on reproductive success.

Peregrine Falcons have contended with a wide array of contaminants since the re-establishment of the breeding population (Morse 1993, Chen et al 2008, 2010, Potter et al. 2009). Continuing the long-term collection and analysis of addled eggs provides a historical record of contaminant exposure within this breeding population.

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